

Airline Dispatch and ATCSCC: A Cooperative Problem–Solving Success Story with a Future

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Abstract

This paper summarizes the information gathered through a Focus Group held in Washington, D.C., to explore interactions between airline Operations Control Centers and The FAA Air Traffic Control Systems Command Center. Eight airline dispatchers and two ATC coordinators from seven airlines, two experienced staff from ATCSCC and one airline captain participated. Observers included eight FAA staff from Research and Development, Flight Standards and Operations Research, and two MITRE Corporation representatives. Factors identified contributing to successful interactions included: a shared understanding of goals, problems, constraints and potential solutions; collaboration that balances distributed responsibilities and knowledge; process control and immediate feedback; and dispatchers assigned to ATC coordinator roles. Enhancements that can be made in the near term include: improved communication to airlines of ATCSCC policies and practices; elimination of ATC practices that lead to flight plans in conflict with FAA regulations; improved consistency in FAA implementation of policies to assist planning on the part of the airlines; assigned roles in airline operations centers for ATCSCC contact; update 121.65 training requirements to reflect the current airline transportation world; reduced response time to airlines regarding non-preferred routes. Airline-ATCSCC cooperation is leading to solutions that increase safety, reduce costs, and improve efficiency.

The Study

Participants

A Focus Group was held in Washington, D.C., to explore interactions between airline Operations Control Centers and the FAA Air Traffic Control Systems Command Center. Eight airline dispatchers and two ATC coordinators from seven airlines, two experienced staff from ATCSCC and one airline captain participated. Observers included eight FAA staff from Research and Development, Flight Standards and Operations Research, and two MITRE Corporation representatives.

Goals

Three researcher goals were :

1. To gain insight into the nature of the distributed and cooperative problem-solving activities that arise in the interaction of the airlines with ATCSCC;
2. To identify the successful aspects of these interactions and to better understand the nature of underlying factors contribution to such successes; and
3. To identify areas for potential improvement in which solutions can easily be identified and implemented or in which additional research is needed.

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Methods

Three researchers led the discussions which were tape recorded. An initial summary was produced, distributed for review and correction, and rewritten. The moderators focused the discussion through a series of questions a sample of which follow.

How successful is the NRP program for different airlines? Are there areas for improvement?

What are the most effective and efficient ways for Dispatchers and ATCSCC staff to interact?

What are examples of the most significant problems that currently arise in ATCSCC interactions with the airlines?

What are potential solutions to these problems?

What are the most effective ways to initiate such changes?

Successful Cooperation

In the evolution of airlines and ATCSCC interaction new procedures have been developed and integrated in such a way as to encourage collaboration and cooperation between FAA and airline staff. The goal has been to improve the efficiency and timeliness of flights, while maintaining or improving safety, thus resulting in lower costs and better service for passengers and cargo delivery.

NRP. As part of the National Route Program (NRP), ATCSCC establishes preferred routes. Dispatchers or pilots can request alternatives to these routes. Requests from the air carriers for non-preferred routes must be submitted to ATCSCC via teletype. The ATCSCC staff member responsible for such requests then contacts the necessary Enroute Centers by phone to see whether they can accommodate the request. Some requests, or portions of requests, may match a list of non-pref routes that can be automatically approved without contacting the involved Center. After contacting the Centers, the ATCSCC staff member informs the dispatcher who made the request by phone or teletype regarding approval, proposed modification or disapproval. The reasons behind a proposed modification or disapproval may also be given. Finally, the dispatcher at the airline must concur with the ATC Coordinator that the approved route is viable.

Success has been achieved even though the technologies used for this particular program have for the most part been rather "unsophisticated." Factors that contributed to success in the non-pref program are:

1. Developing a shared understanding of goals, problems, constraints and solutions;
2. Distributing responsibilities to a number of different individuals; and
3. Incorporating feedback and process control loops into the system.

Airline ATC Coordinators described how they would help Central Flow when possible:

"If Central Flow is having a bad day, and we know when they're having a bad day, we'll raise our threshold on fuel or time savings for requesting a non-pref."

"We know when they're having a bad day with weather routes, so we'll back off."

Financial Success. In 1993, one airline reported requesting 15,279 non-preferred routes, receiving approval for 75%, and saving 13,396,510 lbs. of fuel. A second airline reported that they saved \$4.3 million in fuel costs in one year because of the non-preferred route approval system. This representative reported that upper management finally asked how two guys in the Dispatch Office saved this much money.

Slot Swaps. Discussion of the slot-swap program highlighted the fact that many of the decisions made by ATCSCC staff have to do with allocating resources, including routes and arrival times. Regarding arrival times or slots, the airlines viewed the slot-swap program (a method for allocating resources) favorably, particularly with the soon to be initiated multiple substitution program. The sense of increased cooperation between ATCSCC and the airlines was clearly one of the major themes that permeated the discussions.

Improvements

Communication About Policies and Procedures. A number of times, airline ATC Coordinators raised concerns that, to their surprise, had already been dealt with by ATCSCC. Central Flow has not ignored airline concerns and queries, but has failed to provide the airlines with timely feedback about how they were dealing with such concerns. Minimally, such a lack of timely feedback can create uncertainties between ATCSCC and the airlines. Equally important, it meant that potentially valuable airline input missed the early planning process. This suggests a need for providing some communication channel through which ATC Coordinators can easily raise questions and get answers about policies and practices. It may be that existing channels simply need to be publicized, or it may be that means for direct contact (rather than through extended formal channels like the ATA) need to be improved.

Consistency in Policies and Practices. There appeared to be some concern by the airlines about consistency in the way Central Flow staff members dealt with situations. Uncertainty ranges from minor, such as whether a response to a request for a non-pref would be made via teletype or phone, to more significant as a dispatcher reports: "I can go for a whole week and ask for a route on a specific city pair and get it approved. Then you get a shift change at the Center. Nothing has changed. The weather is exactly the same and now it's disapproved."

Practices Inconsistent with FAA Policies. There was one point about which the Dispatchers and ATC Coordinators vehemently expressed concern. The ATC system can ask Dispatchers to file flight plans which cannot be followed due to weather or other problems. For example, as one dispatcher stated, "You cannot tell people to file a flight plan that legally the Dispatcher must brief the pilot he cannot take – even if he gives him 2 flight plans and he says: 'This is the one I filed for you but this in the one you should fly.' It puts us in a very difficult situation." The ATC specialist apparently assumes that an alternative path will be selected once the aircraft is airborne. The Dispatcher, however, is forbidden by FAR 121 from releasing such a flight since its flight plan is known to be infeasible. An ATC Coordinator provided a parallel example: "...we will get an advisory out from Washington saying: 'We are rerouting traffic this way but don't file it. File the preferred route.'"

Although such problems seem like training or policy problems involving the Enroute Centers and the Central Flow staff who are the intermediaries for route requests, deeper issues are involved. The vehemence with which the airline participants expressed their concern about ATC practices that are inconsistent with FAA policies appears to both be a direct problem and also a symptom of a much deeper and complex set of concerns. Furthermore, these deeper concerns are by no means one-sided, dealing with issues of workload, mutual understanding and respect, and management practices. Participants generally agreed that ATC Coordinators do enhance airline-ATCSCC interaction.

Personalities. These deeper problems may also, however, involve attitudes, perceptions and personalities, as commented on by one Chief Dispatcher:

"On a very broad basis I think perhaps that the people at Central Flow and the Enroute Centers don't recognize that flight Dispatchers are very well trained professionals, that they are familiar with the field of aviation and with the language of aviation.

Another Dispatcher commented: "You can do your greatest work at this level, with the NRP (National Route Plan), and then you get that local controller that says: 'I am in charge. I've got it. You go when I say you go.' They blow your whole scenario, all the work that you've done. I think when you have a personality such that they want to be in control instead of being a team player, you lose the continuity of the whole concept."

A controller suggested that the actual situation is more complex than it might seem at face value: "Sometimes it may not necessarily be wanting to flex your muscles, but it could be when they're faced with the choice of your profitability or (their own) job preservation, that's it."

Constraints, Knowledge and Training. Both the airlines and ATC need to understand each other's constraints. One airline representative reported that requests submitted five hours in advance often do not get approved until 30 minutes before departure precluding fuel savings. Airlines also expressed a need for ATC to have more knowledge regarding the capability of types of aircraft.

Since both knowledge of the situation and immediate goals may differ, the airlines and ATC may see differing optimal solutions at times. One airline proposal was to manage air traffic by having the airlines first propose routes based on cost and efficiency, then have ATC identify and resolve conflicts. Another airline proposal involved holding: "In some instances, I think that perhaps they (Central Flow) should just let the airline decide if we want to go someplace and hold. Their business is to keep airplanes from running into each other in the sky. I should have the option of, if I want to go over there to hold to get in. I should have that option. If I feel the RVR is going to come up and me and the Captain feels it's a safe operation, we've got plenty of holding fuel, we've got a good alternate, if we want to go there and hold and take that chance, we should have the opportunity to do that."

Information and data access. Suggestions to improve information dissemination within airlines and between airlines and ATCSCC were discussed. Teleconferences were identified as sometimes useful but also as fixed in time when some people are not available. Participants agreed that information and data should be more accessible and more information shared.

Real-time information. To meet the need for real-time information participants suggested allowing air carriers to listen to discussions at Centers or to share a database. An ATCSCC representative indicated that if Central Flow had real-time data from the airlines they would see a 30-40% reduction in delays. ATCSCC and Enroute Centers have data that would help the airlines as well. Such information includes capacity rates, length of time flight plans are kept, digital ATIS, and EFC's that reflect reality.

Real time data could help resolve conflicts at choke points which change over time. One airline representative suggested:

"... give us the current ASD data, and give the airlines the ability to project where the red sectors are going to be and when they're going to be. That is, give us the ability to go out and plan to keep that sector from going red by what we do. If we had the ability to see that Rosewood is going to be red at the particular time then we aren't going to bother to ask you for that, which will cut down on the number of routes you'll have to revise."

Inadequate Technical Support. Additional problems arise because of inadequate or poorly designed tools for making use of available information. Inadequate computer support sometimes slows the process of obtaining non-preferred route approval and placed an extra burden on ATCSCC staff.

Interface design. Software used by airlines to interact with Central Flow is deemed cumbersome resulting from a lack of coordination between FAA and airlines in designing the software. There is also an interest in developing intelligent decision aids and advanced graphics displays. Such aids would help with minor route adjustments in which a route may be rejected for a single fix. For example, route requests could be displayed on a computer screen where fixes or route segments that were unavailable could be marked by an ATCSCC staff member (or marked by the responsible Center and transmitted to ATCSCC). Second, possible route adjustments around the fix would be identified by the computer. Alternatively, such deviations could be identified and marked on the computer by Center or ATCSCC staff. Third, these results would be transmitted to the ATC Coordinator for display and consideration. In this way, the ATC Coordinator, ATCSCC specialist and Center specialist could all look at the same display while talking to each other if further discussion was required.

Summary

The focus group identified a number of areas for improving the efficiency and effectiveness of activities at the airlines and ATCSCC. Both airline and ATCSCC representatives indicated that very effective changes have been occurring in these interactions to help improve the efficiency of air travel and reduce airline costs while maintaining or increasing safety. Programs involving requests for non-preferred routes and slot-swapping were highlighted as examples.

Several factors were identified as contributors to these changes, with a major emphasis on an increased sense of cooperation between airline Dispatchers and ATCSCC. These factors included the development of shared goals and knowledge, the distribution of responsibilities, and the incorporation of mechanisms for feedback and process control. The usefulness of these observations lies in the possibility of modeling other potential changes in the air traffic management system on this successful approach to engender cooperative problem solving.

Changes in the interactions of ATCSCC with the airlines have shown major improvements in recent years. These successful changes have resulted from efforts to encourage cooperation between ATCSCC specialists and Dispatchers, allowing them to work together to develop solutions that increase safety, reduce costs and improve efficiency. Additional changes to be considered include:

1. Should the route generation process be changed, and if so, how? What would be the implications for safety, economy, and for organizational roles and responsibilities?
2. How could information be distributed in a more timely and efficient manner, both between ATCSCC and the airlines and within the airlines? This reflects the need for real-time information about delays, acceptance rates, runway closures, weather, etc.
3. What kind of computer support or display tools would make communication and distributed problem solving more efficient?
4. What kinds of changes in resource allocation would improve efficiency (similar to the slot-swap program)?

Additional investigation and action can greatly enhance the safety and efficiency of the national aviation system in the near term. A list of action items follows.

1. Improve avenues for providing direct answers to ATC Coordinators about questions on ATCSCC policies and capabilities.
2. Determine why Centers continue to sometimes advise airline ATC Coordinators (often through ATCSCC) to file routes in conflict with FAR 121.
3. Collect data as part of a process control effort to determine how significant airlines' concerns are over slow response times. Use these data to determine whether there are cost-effective solutions which could involve increased staffing or technological support.
4. Inform those airlines that do not currently communicate with ATCSCC through airline ATC Coordinators about the advantages of doing so.
5. Explore ways to help airline ATC Coordinators deal with the excessive workload demands that arise during periods with widespread weather problems, etc.
6. Identify other areas where limited resources must be allocated (such as deicing slots) and consider implementing solutions analogous to the successful slot-swapping program.

7. Identify areas in which the training of Dispatchers could be improved regarding ATC functions. Use formal mechanisms as well as informal approaches, to implement such improvements.
8. Identify areas for improving the training of ATCSCC staff about the activities of Dispatchers.
9. Experiment (using simulations) with the concept of radically changing the process of managing air traffic by letting the airlines first propose routes and then having ATC identify and resolve conflicts.
10. Develop approaches to support cooperative software design between FAA and the airlines.
11. Identify human factors problems in the design of software used to support interactions between ATCSCC and the airlines.
12. Identify classes of real-time data that could be fruitfully shared by the airlines and ATCSCC.
13. Improve the timeliness and adequacy of communication between ATCSCC and the airlines, and within airline Operation Control Centers by:
 - a. exploring an open-line concept to let Dispatchers listen in on activities at Centers; and
 - b. creating a shared real-time database.
14. Provide improved computer support to display bottlenecks and to suggest route replacements to avoid such bottlenecks.
15. Develop tools to support cooperative work by allowing ATCSCC, Enroute Center and airline staff to view common displays during discussions.
16. Evaluate the possibility of allowing representatives from the air carriers (i.e., experienced Dispatchers) to be stationed at ATCSCC in order to enhance coordination among the airlines and between the airlines and ATCSCC staff. The responsibility to fill such a position could be rotated among the airlines, and would provide a "user representative" on site at ATCSCC.

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